



*Complete Public Safety
BDA Solutions*

In-Building Wireless (IBW)

- About 80% of mobile traffic is consumed and/or generated indoors, where the cellular network doesn't always work well, or at all
- Customers require reliable IBW networks for increased coverage and capacity
- Demand continues to grow as more data-intensive services are used

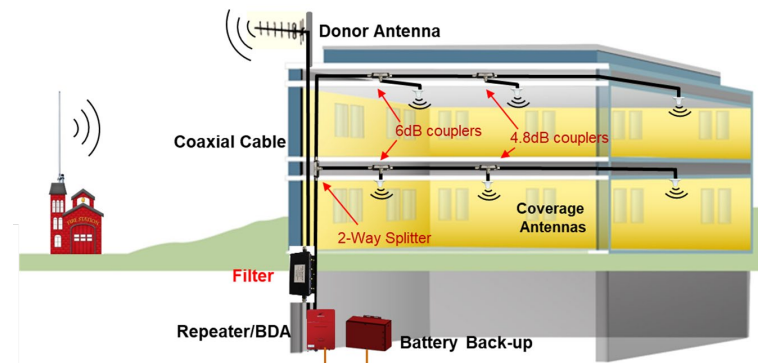
Westell Solutions

- **Public Safety Repeaters** - Delivering solutions First Responders can rely on when it matters most
- **Distributed Antenna System (DAS) Conditioners** – optimize signal performance
 - Universal DAS Interface Tray (UDIT) is an active unit
 - Passive units are also available
- **Commercial Repeaters** – extend coverage into buildings
- **Passive Components** – passive devices used in IBW installations including couplers, duplexers, filters, and antennas



NEW: Public Safety Signal Boosters

- Frequency Bands Supported: VHF, UHF, 700 MHz and 800 MHz
- Firstnet band included in all 700Mhz & dual band models
- Power output from 1/4W to 5W (depending on frequency band)
- Shipments starting mid 2019
- Fully loaded with features
- Independent AGC per filter and time slot
- Solves near-far degradation in PS systems
- UL Listed (UL2524 est. Q3 2019)
- NFPA code compliant
- Integrated Spectrum Analyzer
- Made in the USA



Agenda

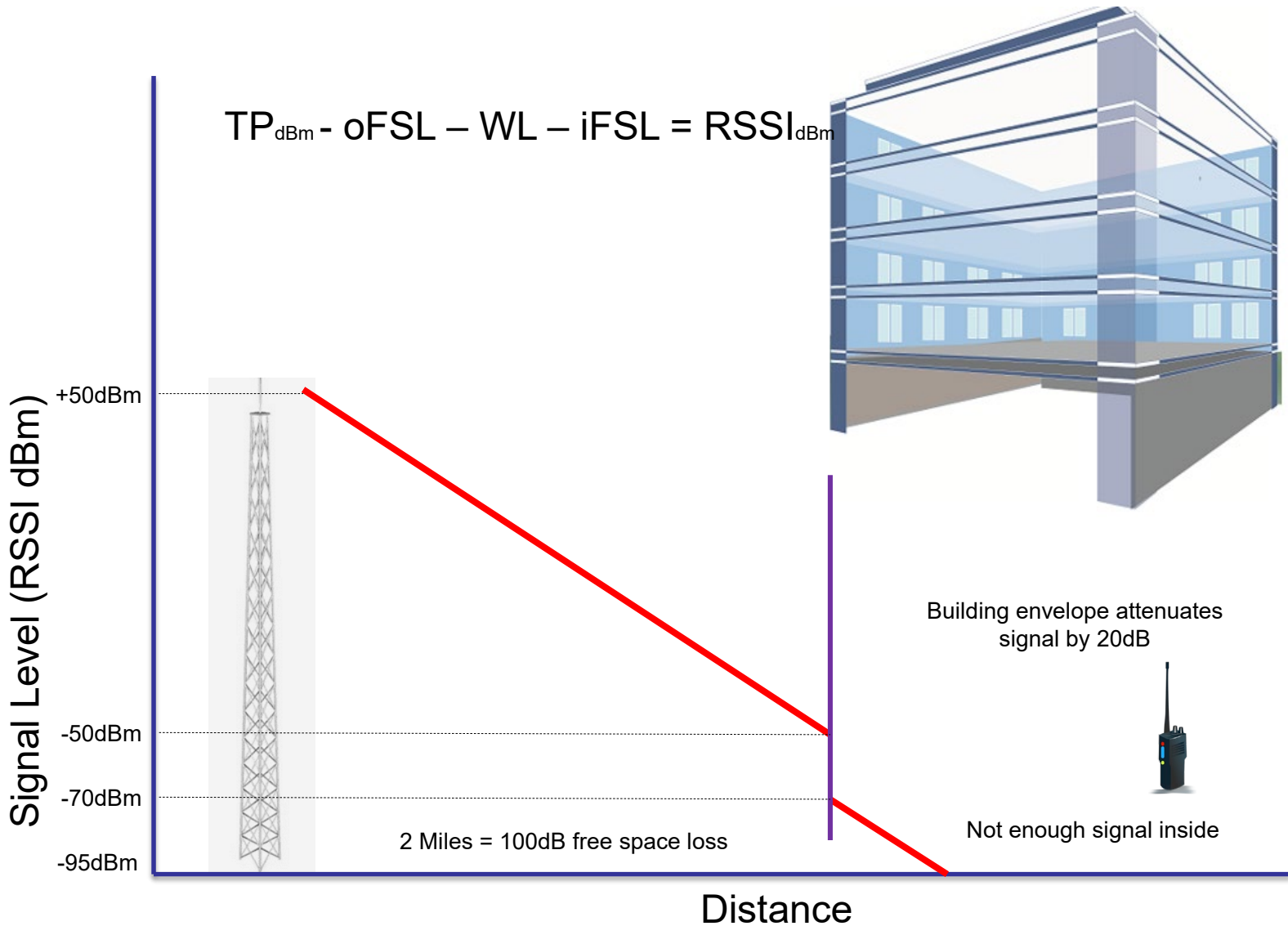
1. RF Signal Integrity
2. Understanding Link Budget
3. Uplink noise power visualized
4. Near-Far effect

RF Signal Integrity, It's all about Signal to Noise Ratio (SNR)

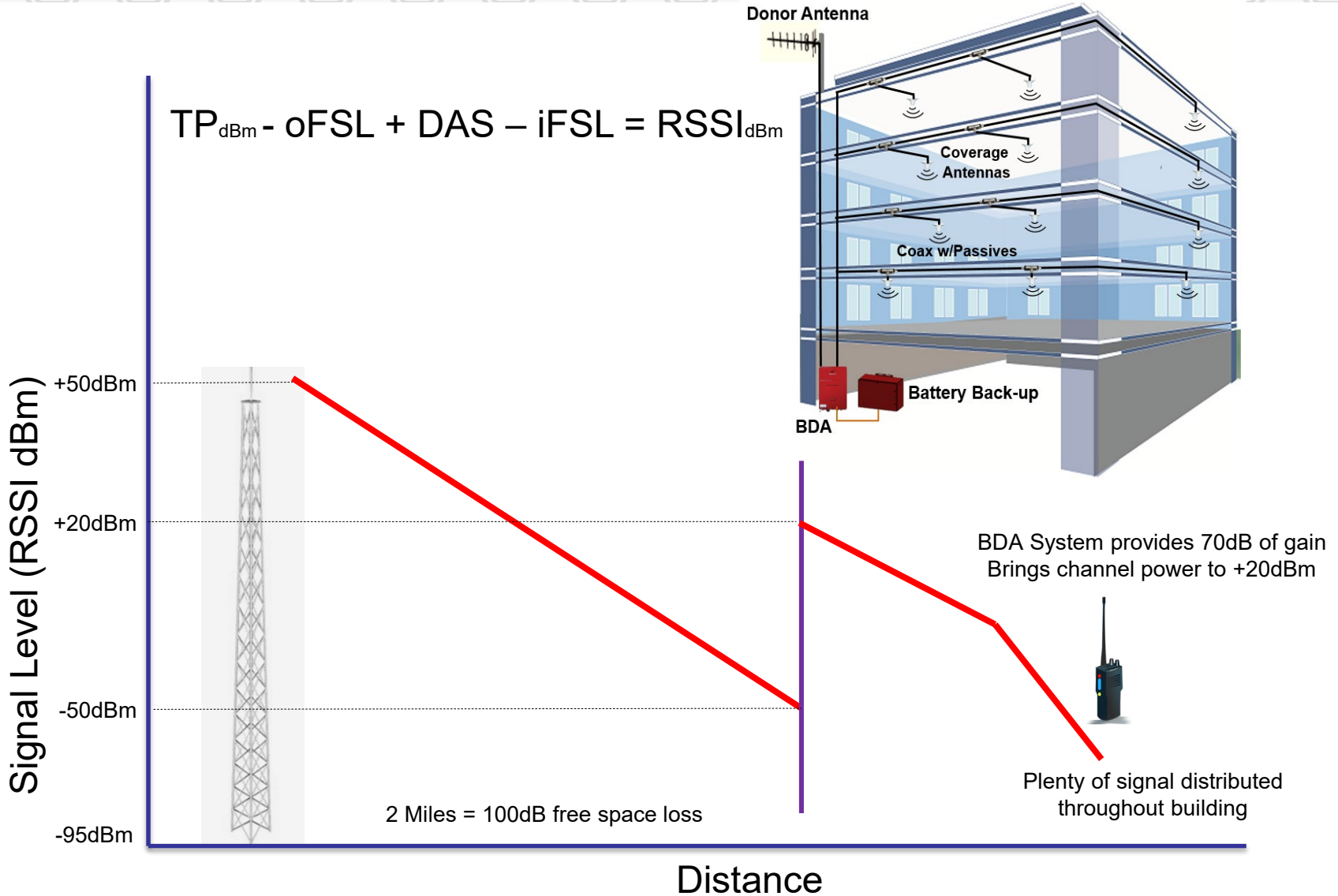
What Impacts SNR?

- Low Donor Signal coming into the BDA
- Environmental Noise
 - Other RF signals
 - Electrical Equipment
 - Multi-path (Delay between direct and indirect RF paths)
 - Class A BDAs with narrow channels can create too much propagation delay
- Low Quality BDAs
- Improper Commissioning

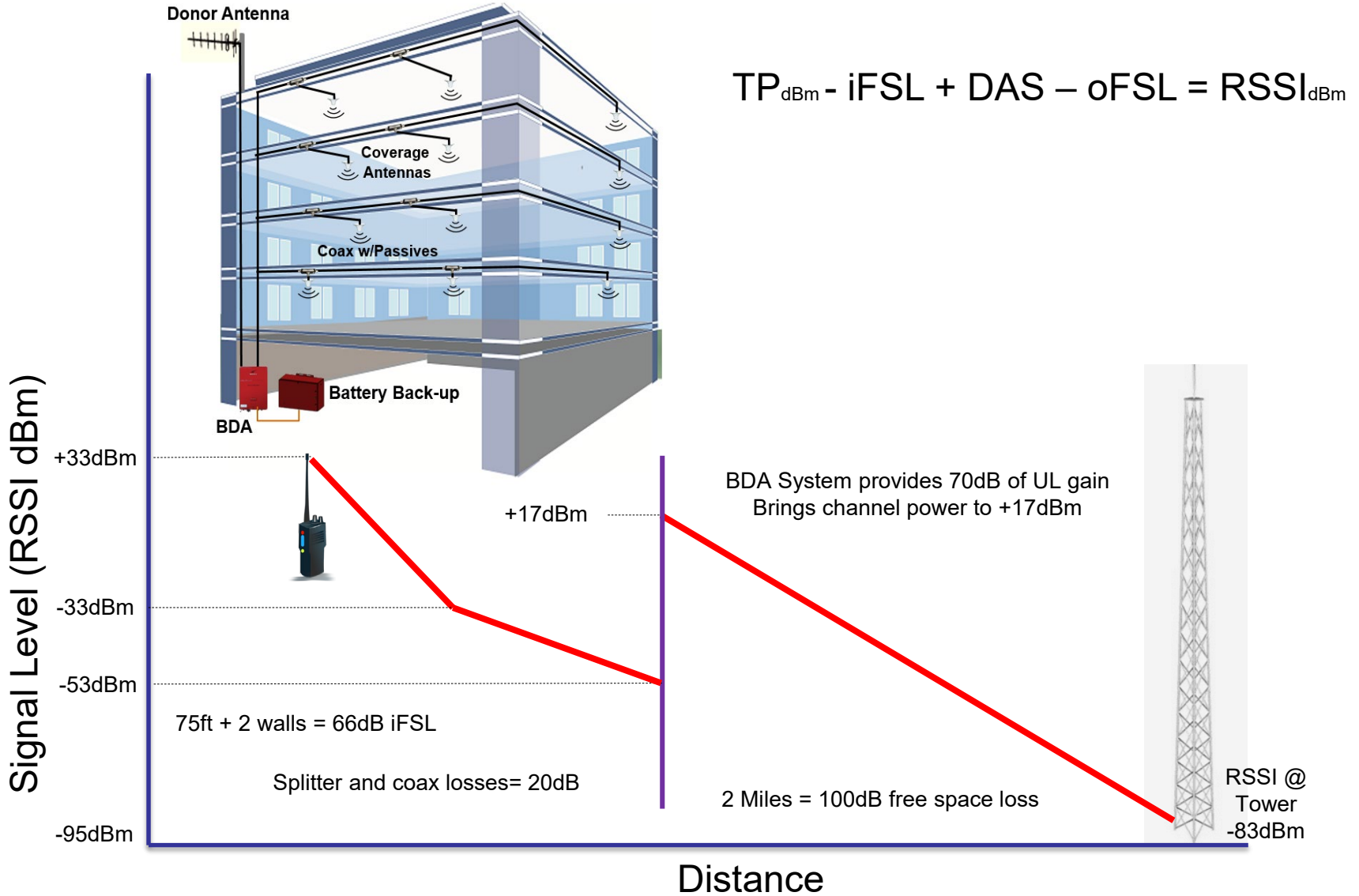
Link Budget Without BDA System



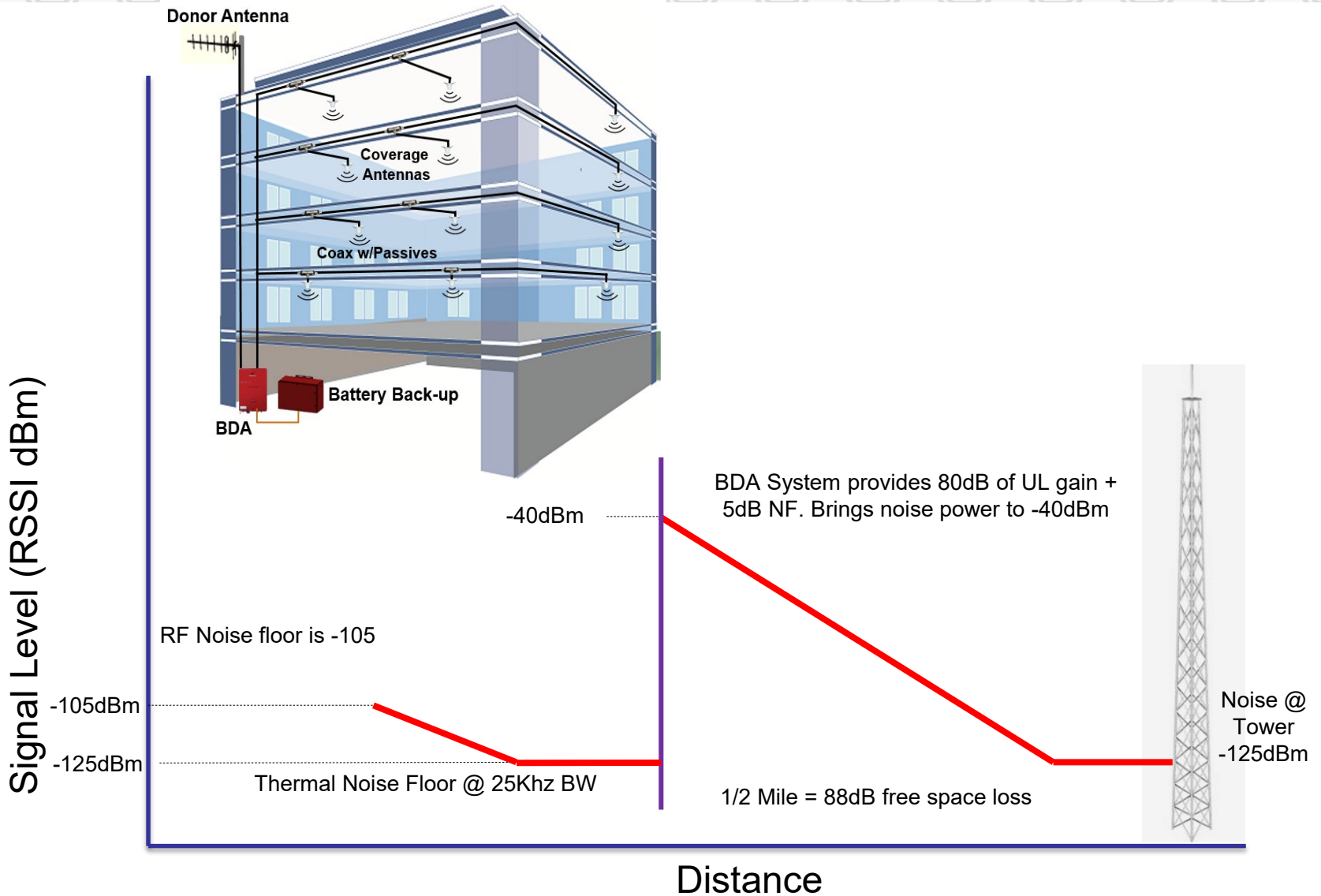
Link Budget With BDA System



Uplink Link Budget With BDA System



Uplink Noise Link Budget With BDA System



Near-Far Effect Animated

RF out TX1 = Good
RF out TX2 = Very Poor

Radio transmits
at 4 watts

2nd portable
transmits from afar

Repeater/BDA

Battery Back-up

Signal received at BDA weak, but
used by the BDA here at full gain

BDA needs 1st portable to keep transmitting
the 2nd portable signal too weak to talk out

Become a Westell Certified Installer

- Westell has shipped over 65,000 repeaters and BDAs for all carriers and thousands of Public Safety installations across the US
- Making public safety BDAs for over 20 years
- Repeater Certification Webinar (Monthly)
 - Review the specific VAR attributes required in order to receive your digital repeater install and commissioning certification

<http://www.westell.com/services-support/training/>



Solutions to near-far effect

- More antennas indoor so there's less differential between near and far signal levels
- Channelized repeater with AGC per filter and per time slot



Questions?
Thoughts?